ERCB

LODGEPOLE
Blowout Report

Addendum to Report D84-9

LODGEPOLE BLOWOUT INQUIRY

ADDENDUM TO THE PHASE 1 REPORT

WITH RESPECT TO THE FLOW RATE OF
THE BLOWOUT OF THE WELL, AMOCO DOME
BRAZEAU RIVER 13-12-48-12

DECEMBER 1984

LODGEPOLE BLOWOUT INQUIRY PANEL

LODGEPOLE BLOWOUT INQUIRY PANEL
ADDENDUM TO THE PHASE 1 REPORT

The Addendum concerns

The flow rate of the well, AMOCO DOME BRAZEAU RIVER 13-12-48-12, which blew out of control on 17 October 1982.

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ADDENDUM TO THE LODGEPOLE BLOWOUT INQUIRY PHASE 1 REPORT (DECISION D 84-9): NEW INFORMATION RESPECTING THE ESTIMATED FLOW RATE FROM THE 13-12 WELL

1 INTRODUCTION

Evidence at the inquiry indicated that the estimated flow rate for the well, AMOCO DOME BRAZEAU RIVER 13-12-48-12 (13-12 well), was approximately 1.4×10^6 m^3/d. This was the rate estimated to have prevailed during the last 52 days of the blowout after the crimped drill pipe and other restrictions to flow were no longer in place. In section 3.4 of the Lodgepole Blowout Inquiry Phase 1 report (the report), the Panel indicated that a partial flow test of the well had been conducted subsequent to the inquiry, and while details of the test had not been made public, the Panel understood that the 13-12 flow rate could have been substantially higher than estimated during the inquiry. Notwithstanding the possibility of a higher flow rate, the original estimate of 1.4×10^6 m^3/d was adopted by the Panel, and is reflected in the text of the report and in the recommendations, although in some sections of the report reference is made to the implications of a possibly higher flow rate.

2 REASONS FOR THIS ADDENDUM

The ERCB has recently received the results of the partial test conducted at the 13-12 well, during the period 11-16 July 1984. In addition, the results of the test were discussed at an ERCB public hearing on 27 to 29 November 1984, dealing with the appropriate depletion strategy for the Nisku pools in the general area of the blowout.

The July test at the 13-12 well had to be interrupted because of equipment capacity problems, and consequently, the well was only tested at actual flow rates of 540×10^3 m^3/d or less. However, techniques exist for interpreting such test data and estimating the maximum rate at which the well could have flowed had it been produced in a wide open condition. Estimating the flow rate requires considerable interpretation when actual test rates are substantially less than the estimated open-flow potential, as was the case for the 13-12 well test. Nevertheless, a detailed analysis of the data suggests the flow from the well during the blowout was considerably greater than the 1.4×10^6 m^3/d reflected in the report and was likely at least twice as high as the estimate and possibly three times as high or more.[1]

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1 The Panel understands that, at the ERCB hearing on 27 to 29 November 1984, Amoco gave evidence that it still believes the flow rate of the 13-12 well is in the order of 1.4×10^6 m^3/d.

The difference between the previously estimated flow rate of 1.4×10^6 m^3/d and current indications of at least 2.8×10^6 m^3/d and possibly 4.2×10^6 m^3/d or greater, is so substantial that the Panel considers it essential to make this new information available. Additionally, the Panel believes it necessary to review its findings and recommendations as presented in the report in light of the higher flow figures.

3 REVIEW OF THE FINDINGS AND RECOMMENDATIONS OF THE REPORT

The Panel has reviewed the findings and recommendations of section 12 of the report in light of the new estimated flow rates. While the Panel does not see the need to alter any of its previous findings or recommendations, the new information does assist in better understanding some of the matters discussed at the inquiry and addressed in the report. Indeed, in many respects, the new information only adds emphasis to several of the Panel's recommendations.

3.1 Cause of the Blowout

The Panel believes the knowledge that the 13-12 well penetrated a much more productive zone than was anticipated helps explain several aspects of the blowout. The volume of gas entering the wellbore while the kick developed to the blowout stage was probably much larger than previously estimated. That information assists in better understanding the difficulties encountered by Amoco as it attempted to circulate out the kick, as well as the failures of the degasser, and the pipe being forced out of the hole. It also reinforces the Panel's conclusion that drilling operations should be carefully planned, making full allowance for unexpected developments. Additionally, it emphasizes the need to conduct drilling operations in an extremely cautious manner, particularly when drilling in the critical zone.

3.2 Regaining Control of the Well

The significantly higher flow rate helps explain the difficulties encountered by the well-control specialists when trying to regain control of the 13-12 well. It is not likely that this knowledge would have altered any of the well-control plans, although it might have increased the degree of planning and caution exercised by the well-control crew.

The higher flow rate helps explain why the drill pipe blew out of the hole during control Plan B, resulting in the first fire. It may have aggravated the accident which interrupted the Plan C capping attempt, because a much greater volume of raw sour gas would be deflected when the capping assembly was being lowered through the well flow to be bolted on to the casing.

3.3 Effects of the Blowout

In its report, the Panel concluded that during the 67 days the well was out of control, there was a daily emission of 150 to 450 tonnes of sulphur and 300 to 1100 m^3 of condensate. The new flow rate estimate results in at least a doubling of those values, and perhaps a tripling. Consequently, for 52 days sulphur emissions from the well were in the order of 900 tonnes per day, and possibly as high as 1400 tonnes per day. By way of comparison, emissions from all of the sour gas plants, power plants, and oil sands plants operating in the province are about 750 tonnes per day. Emissions of condensate were in the order of 2200 to 3300 m^3/d.

Because the Panel evaluated the effects of the blowout on human health by consideration of anecdotal evidence submitted by local residents, a change in the estimated flow rate does not affect the related conclusions. However, the new information does help explain the extent of the reaction by the public to the event. It also makes it understandable why odours occurred over such a broad area of the province, and indeed, on several occasions well beyond the province.

The new information is particularly significant in comparing actual H_2S concentrations recorded by monitors with the estimated concentrations. The former, of course, would reflect the impact of the actual emissions from the well. The latter, at least during the inquiry, and during the subsequent review of the evidence by the Panel, were based on a flow rate of 1.4×10^6 m^3/d. The new higher flow rate would alter the estimated isopleth values shown in Figure 7.5 of the report. A revised figure has been prepared using flow rates of 2.8×10^6 m^3/d and 4.2×10^6 m^3/d, and 25 per cent H_2S gas. Figure A.1 shows that the 15-ppm isopleth band for these two flow rates lies east of Drayton Valley, and as much as 48 to 66 km from the well.

One of the matters discussed in the report was the recommendation by PASGEC, that for emergency planning purposes, the 15-ppm isopleth should be adopted rather than the current 100-ppm isopleth. In considering that recommendation, the Panel concludes, in the report, that the predicted H_2S concentrations under the isopleth system were several times greater than actual monitoring results. The change in the flow rate only emphasizes the very conservative nature of the isopleth calculation. To illustrate this point, the Panel has plotted in Figures A.2 and A.3 the actual hourly H_2S concentrations recorded at the Drayton Valley stationary monitoring unit during the two periods when the well was not on fire, as well as the isopleth value at Drayton Valley. Assuming the 2.8×10^6 m^3/d flow rate, the isopleth value at Drayton Valley would be about 17 ppm. The figures show that the monitor did not record any concentrations for most of the 26 days and that the highest concentration recorded was 2.7 ppm. The Panel has made similar comparisons for the Cynthia and Lodgepole stationary monitors, shown in Figures A.4, A.5, A.6, and A.7. While there are a few instances when concentrations exceeded the recording capacity of the monitor, the data

confirms the extreme conservatism inherent in the isopleth values. The Panel believes that the new evidence substantiates the view expressed in the report that the ERCB should reconsider the use of the 100-ppm calculated isopleth as the basis for establishing the planning zone in emergency response plans.

3.4 Responses by ERCB and Government Departments

The Panel believes the new information emphasizes the several recommendations made respecting the ERCB and Government departments. It provides a new dimension respecting the need for effective communication and co-ordination. It reinforces the Panel's views that all of the parties should have been more cognizant of, and responsive to, the emissions from the well.

3.5 Summary

The knowledge that the 13-12 well was likely flowing at two or three times the volume estimated at the time of the inquiry does not change the overall conclusions of the report. It helps explain some of the events that took place during the blowout and generally reinforces many of the Panel's recommendations. The new information identifies the Lodgepole event as being a unique incident, with probably one of the highest H_2S release rates that could be encountered anywhere in the province.

ISSUED at Calgary, Alberta, on 11 December 1984.

LODGEPOLE BLOWOUT INQUIRY PANEL

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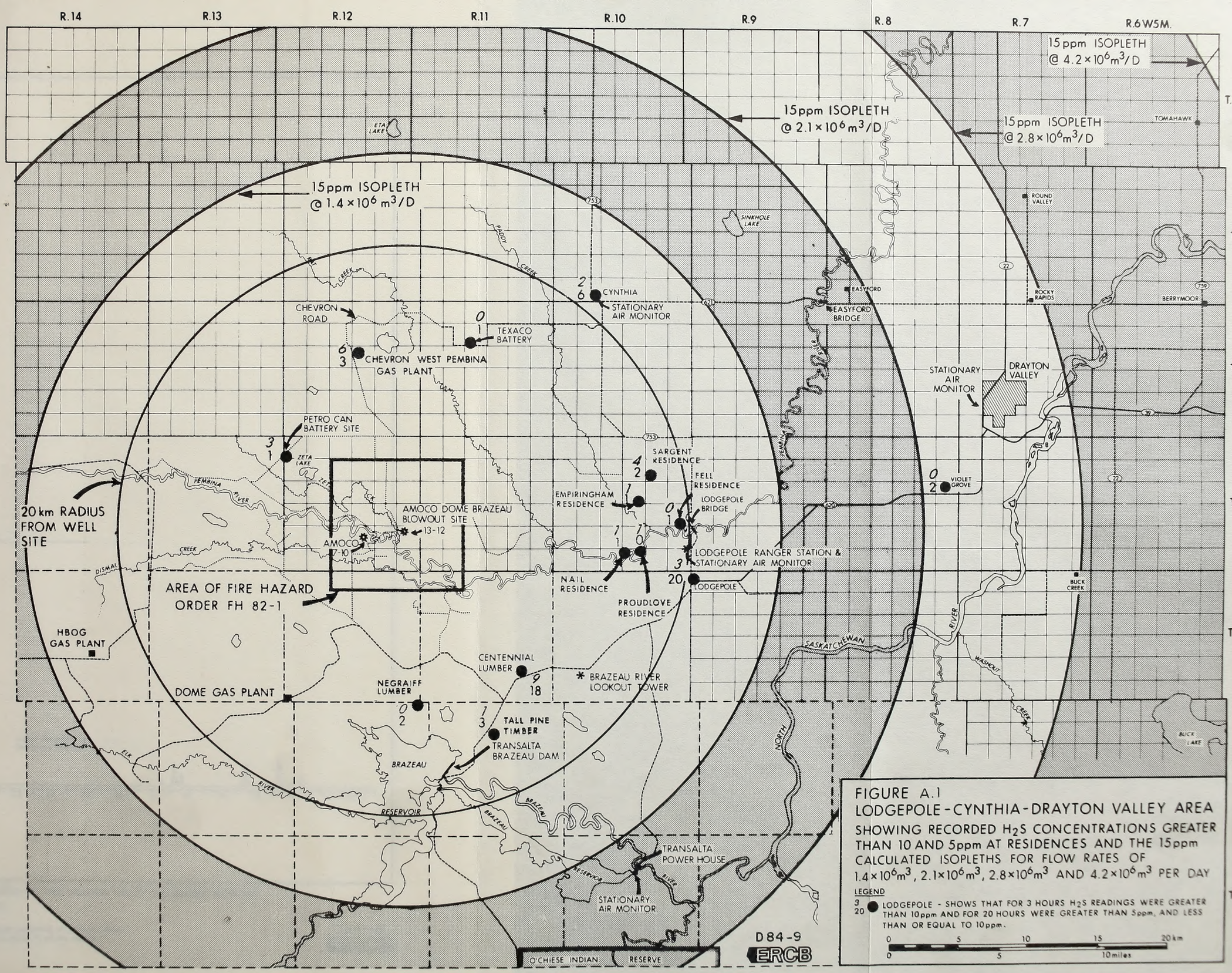


FIGURE A.1

LODGEPOLE - CYNTHIA - DRAYTON VALLEY AREA

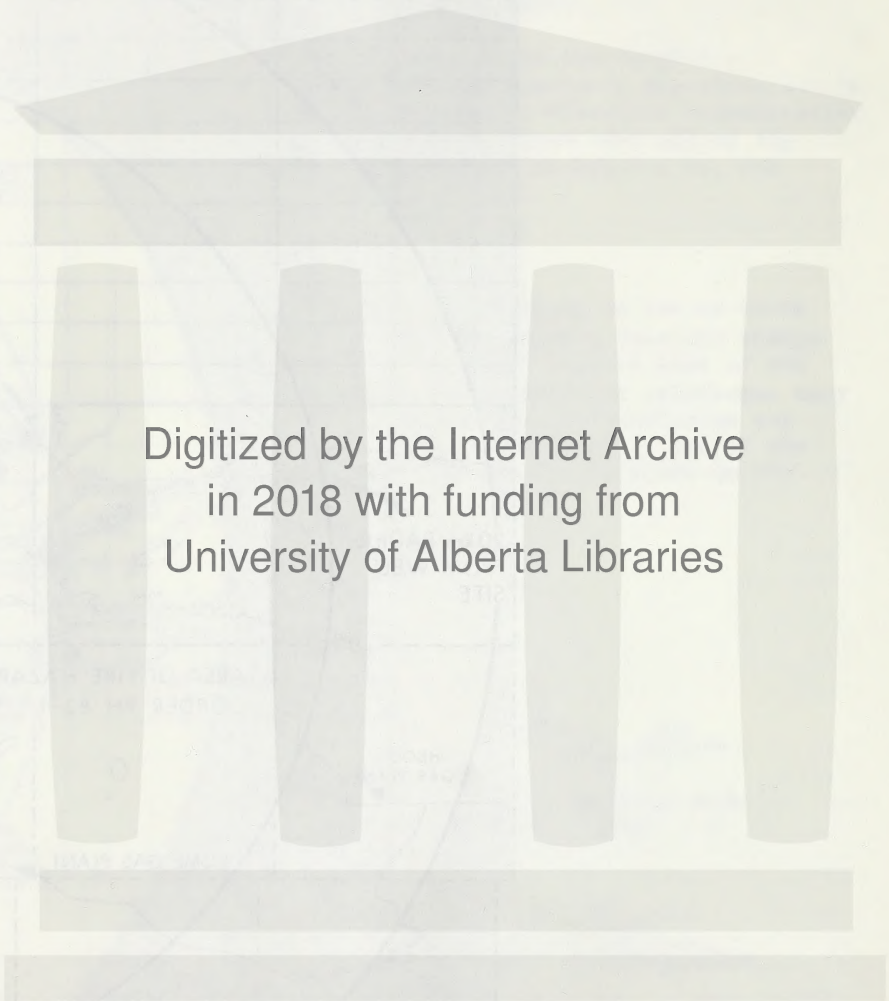
SHOWING RECORDED H_2S CONCENTRATIONS GREATER THAN 10 AND 5ppm AT RESIDENCES AND THE 15ppm CALCULATED ISOPLETHS FOR FLOW RATES OF $1.4\times10^6m^3$, $2.1\times10^6m^3$, $2.8\times10^6m^3$ AND $4.2\times10^6m^3$ PER DAY

LEGEND

3/20 ● LODGEPOLE - SHOWS THAT FOR 3 HOURS H_2S READINGS WERE GREATER THAN 10ppm AND FOR 20 HOURS WERE GREATER THAN 5ppm, AND LESS THAN OR EQUAL TO 10ppm.

0 5 10 15 20 km

0 5 10 miles



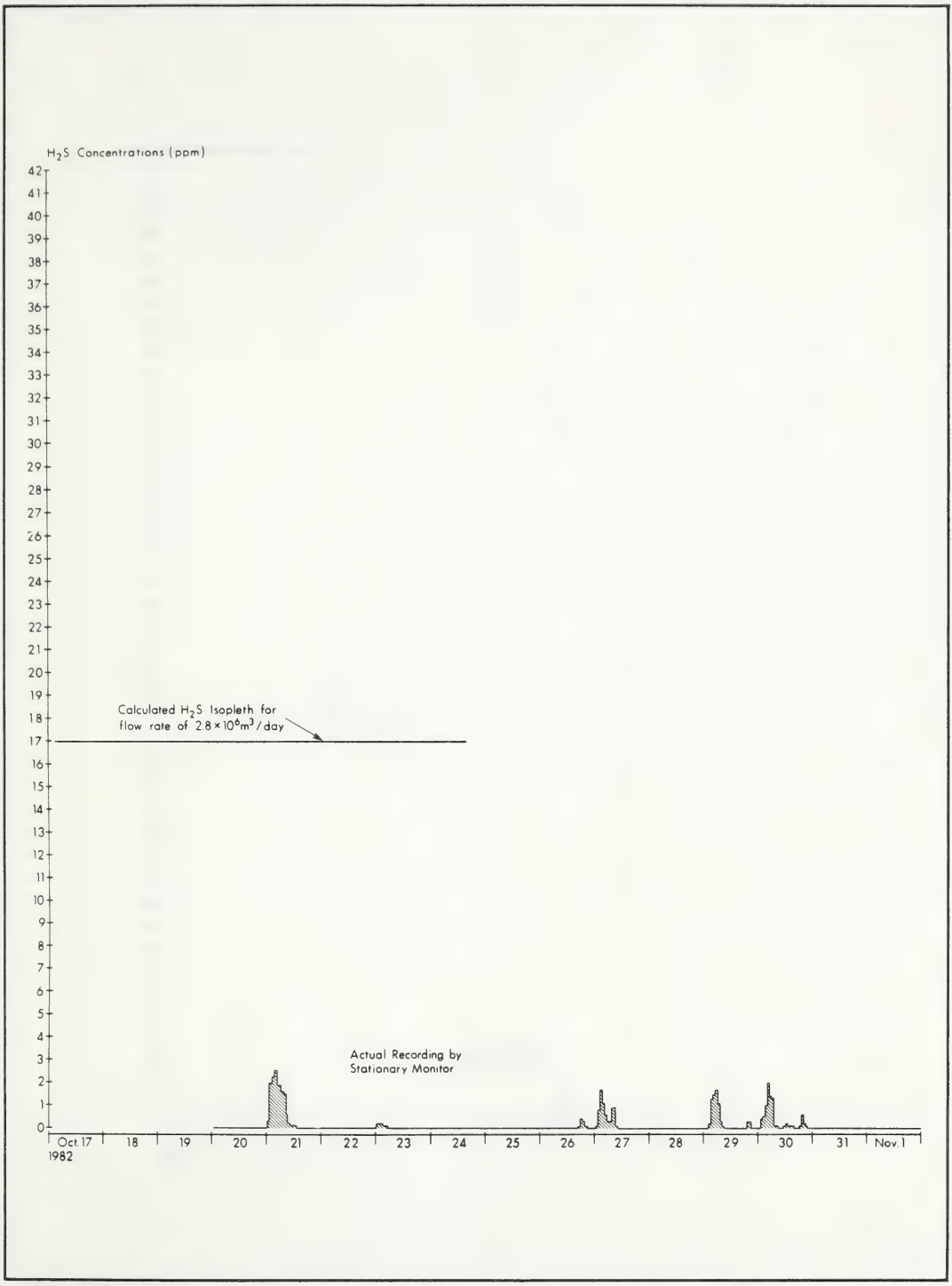


FIGURE A.2 H_2S CONCENTRATIONS RECORDED BY THE DRAYTON VALLEY STATIONARY MONITOR. 17 October to 1 November, 1982.

H_2S concentrations greater than 5ppm recorded at Drayton Valley by mobile monitor are summarized on table 7.1 of the report.

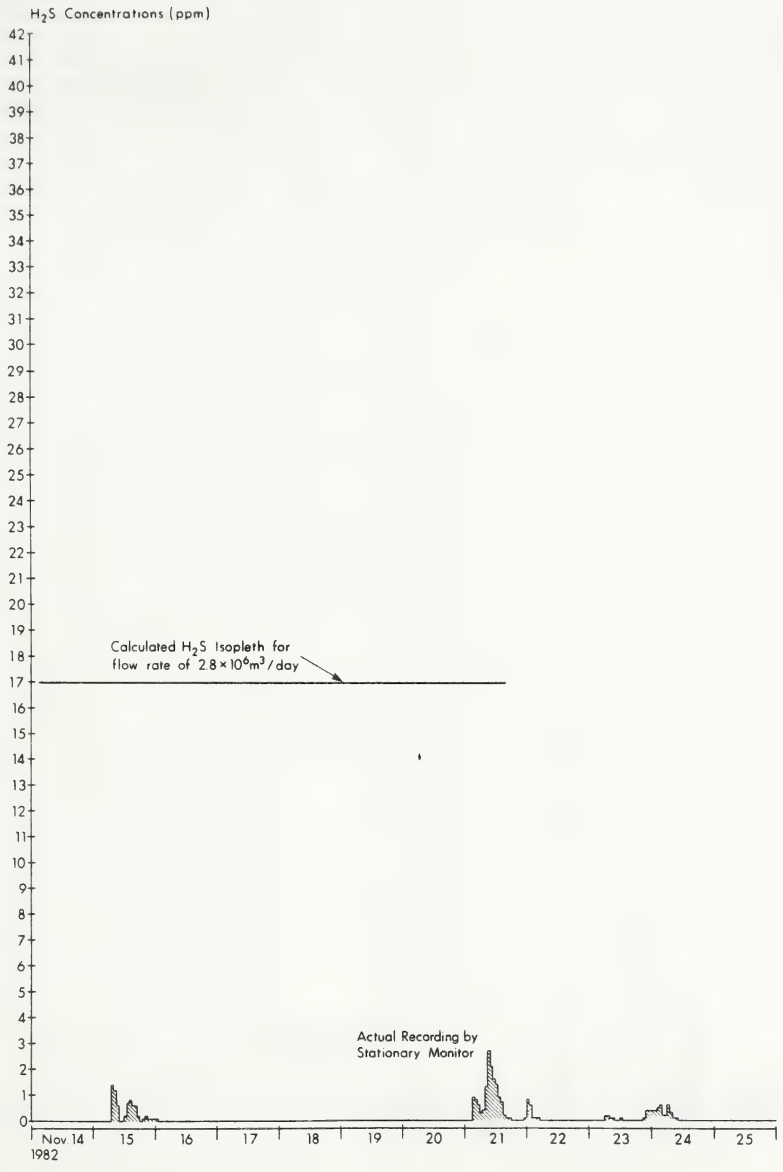


FIGURE A.3 H_2S CONCENTRATIONS RECORDED BY THE DRAYTON VALLEY STATIONARY MONITOR. 14 November to 25 November, 1982.

H_2S concentrations greater than 5ppm recorded at Drayton Valley by mobile monitor are summarized on table 7.1 of the report.

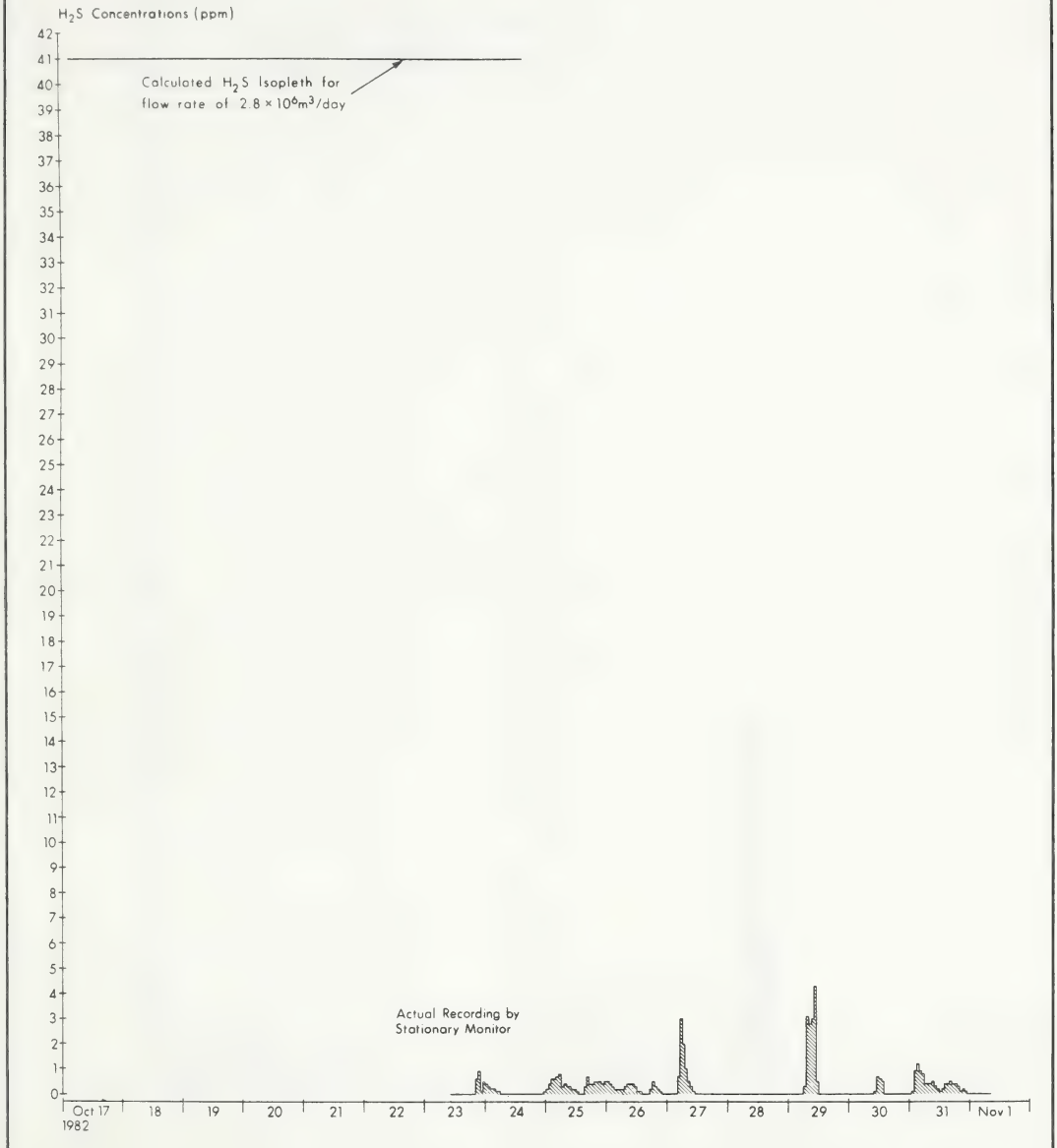


FIGURE A.4 H_2S CONCENTRATIONS RECORDED BY THE CYNTHIA STATIONARY MONITOR.
17 October to 1 November, 1982.

H_2S concentrations greater than 5ppm recorded at Cynthia by mobile monitor are summarized on table 7.1 of the report.

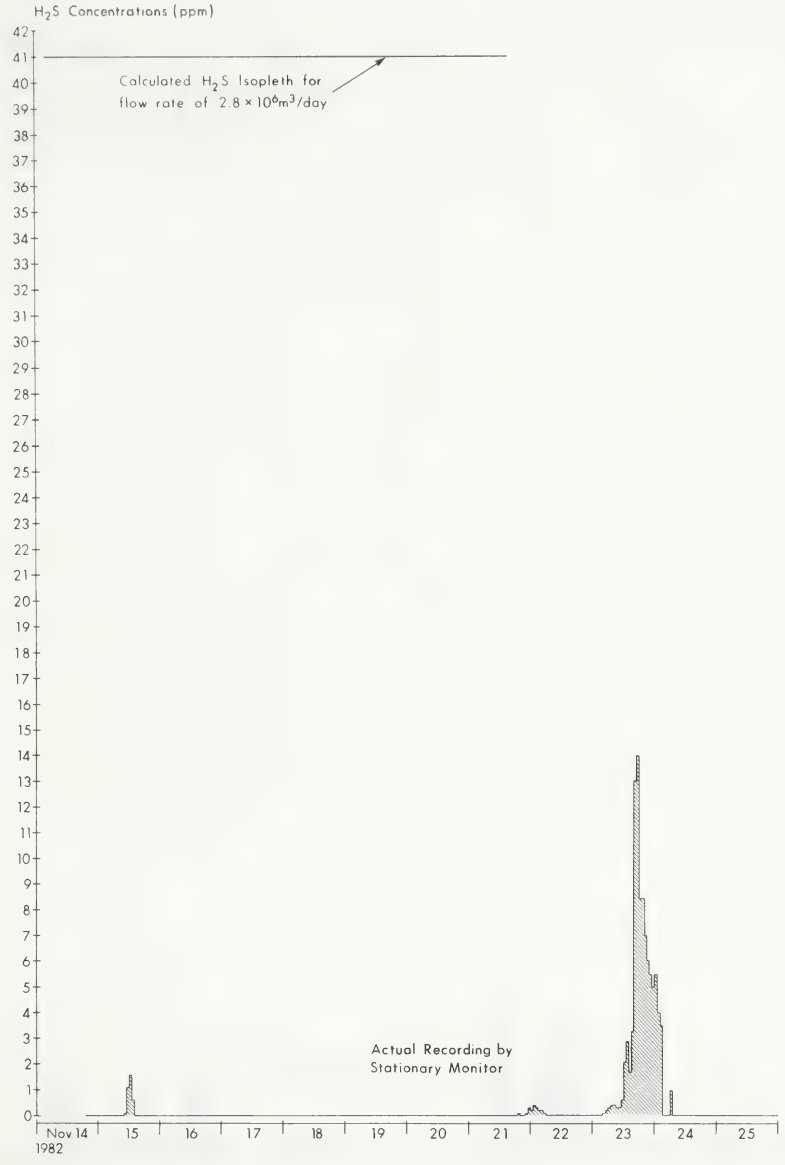


FIGURE A.5 H_2S CONCENTRATIONS RECORDED BY THE CYNTHIA STATIONARY MONITOR.
14 November to 25 November, 1982.

H_2S concentrations greater than 5ppm recorded at Cynthia by mobile monitors are summarized on Table 7.1 of the report.

The stationary monitor at Cynthia did not function from 00:00 to 17:00 24 November.

H_2S concentrations shown for the period 16:00 23 November to 07:00 24 November were recorded by mobile monitors and are taken from Figure 7.4 of the report.

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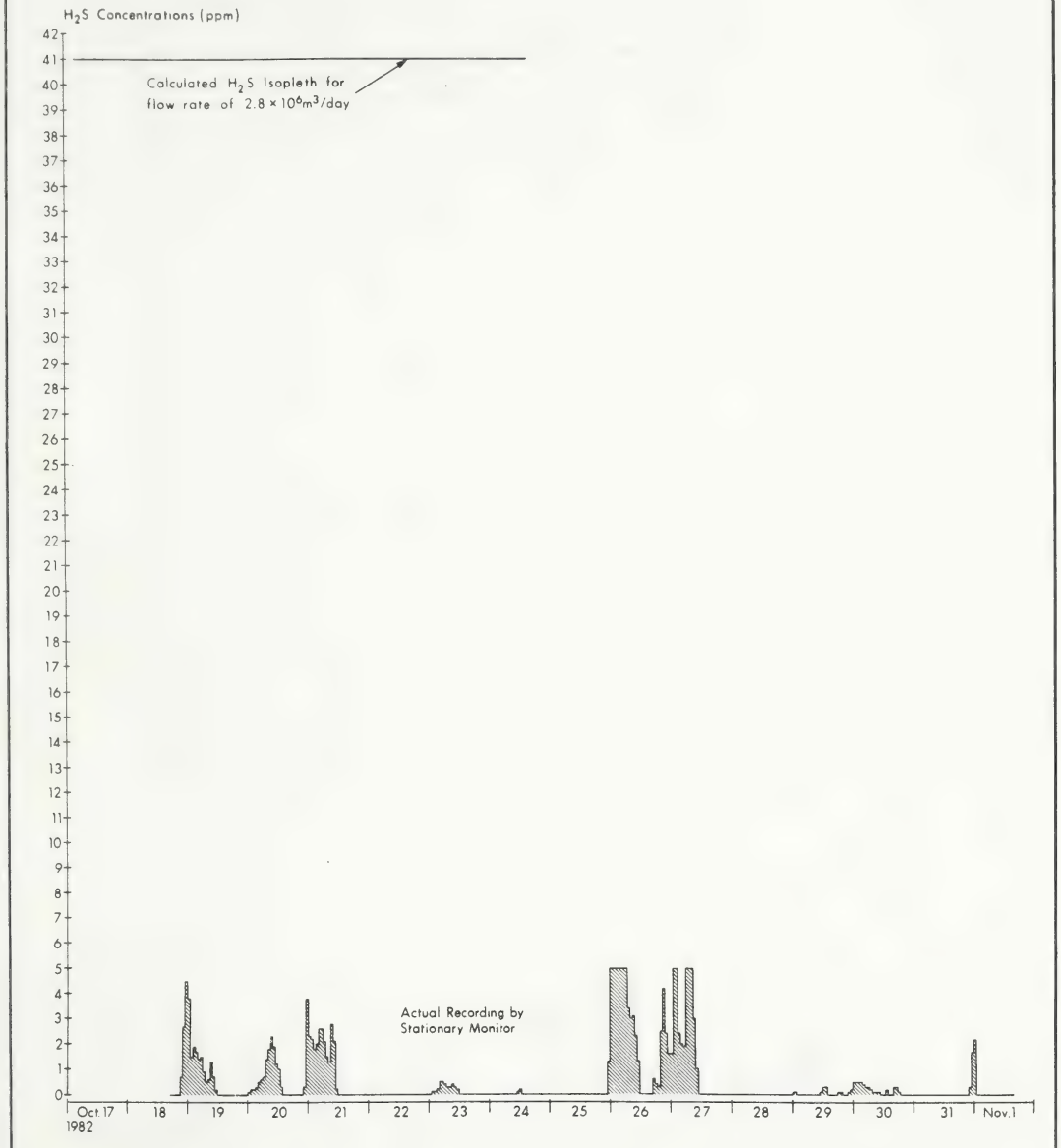

FIGURE A.6 H_2S CONCENTRATIONS RECORDED BY THE LODGEPOLE STATIONARY MONITOR. 17 October to 1 November, 1982.

H_2S concentrations greater than 5ppm recorded at Lodgepole by mobile monitor are summarized on table 7.1 of the report.

FIGURE A.7 H_2S CONCENTRATIONS RECORDED BY THE LODGEPOLE STATIONARY MONITOR.
14 November to 25 November, 1982

H_2S concentrations greater than 5ppm recorded at Lodgepole by mobile monitor are summarized on table 7.1 of the report.

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